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Development of the high-current plasma modulators using Pierce instability. ALEKSANDR MUSTAFAEV, ARTEM GRABOVSKIY, BORIS KLIMENKOV, St. Petersburg Mining University, VLADIMIR SOUKHOMLINOV, St. Petersburg State University, VIKTOR KUZNETSOV, Ioffe Institute RAS — At present, the problems of current control in the electrical circuits of space nuclear power plants are topical [1]. In this talk results of experimental studies of the diode and triode current modulators, intended for use in terrestrial and space current conversion systems are presented. These devices effect current modulation through propagation of plasma structures in the electrode gap and does not require any use of external forces. Such structures are formed through propagation of electronic Pierce instability in plasma. Experiments conducted in a Knudsen diode with a Cs-Ba filling demonstrated the feasibility of full modulation of current at voltage of 5-6 V and discharge current density of ˜10 A/cm^2. With electrode gap 0.2-2.0 mm wide, a stable modulation of current and voltage with frequencies of 5-20 kHz and complete current cut-off existed at Cs pressures of 1,5•10^{-3}-3,5•10^{-3} Torr. Investigations of triode device demonstrated that mechanisms of discharge extinction and spontaneous breakage are associated with nonlinear oscillations. Stable modulation at frequencies of 1-10 kHz of specific electric power of 5 kW/cm^2 and an efficiency of more than 95% was obtained at the anode voltage 50 V. [1] A. Mustafaev, A. Grabovskiy, O. Murillo, V. Sukhomlinov, V. Kuznetsov. Cont. pap. of the 44$^{\text{th}}$ EPS Conference on Plasma Physics. Vol. 41F, P5.309.

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